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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,156	01/13/2004	Wesley N. Cobb	ASI.01	3326

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SWANSON & BRATSCHUN L.L.C.
1745 SHEA CENTER DRIVE
SUITE 330
HIGHLANDS RANCH, CO 80129

EXAMINER	
MILLER, ROSE MARY	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/756,156	COBB, WESLEY N.	
	Examiner	Art Unit	
	Rose M. Miller	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *10-17,25 and 26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8,9,18-22,24 and 27* is/are rejected.

7)☒ Claim(s) *5-7 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, Claims 1-24, and species I (a) within the elected Group, in the reply filed on 06 September 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 8-9, 18-22, 24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Rose et al. (US 5,629,485)** in view of **Riebel (US 4,706,509)**.

With regards to independent claim 27 and dependent claim 1, **Rose et al.** discloses determining the composition (classification) of a material, the method comprising: measuring a wave attribute of multiple ultrasonic waves transmitted at multiple frequencies, the wave attribute being selected from a group consisting of an attenuation and a phase of the multiple ultrasonic waves (measures attenuation, see Figure 3); derives a curve of the measured wave attribute (see Figure 3) as a function of change in the ultrasonic wave frequency (definition of frequency signature utilized); identifying a shape feature from the curve related to the composition (classification) of the material (pattern recognition, see column 5 line 56 – column 6 line 42); and determining the composition (classification) of the material from the shape feature.

Rose et al. discloses the claimed invention with the exception of transmitting the ultrasonic waves through the material to be tested. **Riebel** teaches transmitting ultrasonic waves

of varying frequencies through a material under test in order to determine an attenuation (adsorption) vs. frequency measurement of the material (determines a frequency spectrum) in order to determine the composition of the material under test. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to allow for the transmission of the ultrasonic waves directly through the material under test as **Riebel** clearly teaches that the frequency spectrum (attenuation vs. frequency graph) obtained from the transmission of the ultrasonic waves directly through the material is a good indication of the composition or classification of the material under test.

With regards to claim 2, **Rose et al.** discloses the claimed invention with the exception of determining a mean particle size of particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the mean particle size found within a material suspension that is tested by the ultrasonic attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the mean particle size as taught by **Riebel** in order to give a better indication or classification of the material being tested.

With regards to claim 3, **Rose et al.** discloses the claimed invention with the exception of determining a size range of the largest particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the size range of the largest particles found within a material suspension that is tested by the ultrasonic attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the a size range of the largest particles as taught by **Riebel** in order to give a better indication or classification of the material being tested.

With regards to claim 4, **Rose et al.** discloses the claimed invention with the exception of determining a component ratio of particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the component ratio of particles found within a material suspension that is tested by the ultrasonic attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the component ratio of particles as taught by **Riebel** in order to give a better indication or classification of the material being tested.

With regards to claim 8, **Rose et al.** discloses the claimed invention with including determining the composition of the material from a predetermined relationship between the material composition and the shape feature of the attenuation curve. This is performed by the appropriate feature extraction and pattern recognition performed by the system of **Rose et al.**

With regards to claim 9, both **Rose et al.** and **Riebel** disclose utilizing a known material to compare the attenuation signals to in order to determine the composition of the material under test. **Rose et al.** discloses utilizing a pattern recognition which includes patterns from known materials while **Riebel** teaches utilizing an in-situ reference material for the comparison.

With regards to claim 18, **Rose et al.** discloses an apparatus for determining the composition (classification) of a material, the apparatus comprising: means for measuring a wave attribute of multiple ultrasonic waves transmitted at multiple frequencies, the wave attribute being selected from a group consisting of an attenuation and a phase of the multiple ultrasonic waves (measures attenuation, see Figures 1 and 3); means for deriving a curve of the measured wave attribute (controller 134, see also Figures 3 and 7-8) as a function of change in the ultrasonic wave frequency (definition of frequency signature utilized); means for identifying a shape feature from the curve related to the composition (classification) of the material (pattern recognition performed by microcontroller 214, see column 5 line 56 – column 6 line 42); and means for determining the composition (classification) of the material from the shape feature.

Rose et al. discloses the claimed invention with the exception of transmitting the ultrasonic waves through the material to be tested. **Riebel** teaches transmitting ultrasonic waves of varying frequencies through a material under test in order to determine an attenuation (adsorption) vs. frequency measurement of the material (determines a frequency spectrum) in order to determine the composition of the material under test. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to allow for the transmission of the ultrasonic waves directly through the material under test as **Riebel** clearly teaches that the frequency spectrum (attenuation vs. frequency graph) obtained from the transmission of the ultrasonic waves directly through the material is a good indication of the composition or classification of the material under test.

With regards to claim 19, **Rose et al.** discloses the claimed invention with the exception of determining a mean particle size of particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the mean particle size found within a material suspension that is tested by the ultrasonic

attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the mean particle size as taught by **Riebel** in order to give a better indication or classification of the material being tested.

With regards to claim 20, **Rose et al.** discloses the claimed invention with the exception of determining a size range of the largest particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the size range of the largest particles found within a material suspension that is tested by the ultrasonic attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the a size range of the largest particles as taught by **Riebel** in order to give a better indication or classification of the material being tested.

With regards to claims 21 and 22, **Rose et al.** discloses the claimed invention with the exception of determining a component ratio of particles in a material suspension from the measured attenuation curve. **Riebel** discloses that the measured attenuation curve is a good indication of the component ratio of particles found within a material suspension that is tested by the ultrasonic attenuation method (see column 2, line 49 –column 3 line 62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Rose et al.** to include an indication of the component ratio of particles as taught by **Riebel** in order to give a better indication or classification of the material being tested. With respect to claim 22, the determination of multiple suspending constituents is merely an extension of the determination of a component ratio and would have been obvious to one of ordinary skill in the art when more than one components can be found in a fluid suspension.

With regards to claim 24, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system with **Rose et al.** with a wall to shield the ultrasonic transducer from the suspension under test as the sensitivity of ultrasonic transducer to corrosion and other environmental conditions is well known through out the art of ultrasonic measuring and testing. Therefore, one of ordinary skill in the art would know to shield the ultrasonic transducer from the harsh environments by any suitable manner, including a wall.

Allowable Subject Matter

5. Claims 5-7 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest a method for determining the composition of a material, comprising, in combination with the other recited steps, (1) determining the mean particle size in the material suspension from the maximum slope of the attenuation curve near a frequency where the wavenumber is approximately equal to 1, (2) determining the size range of the largest particles in the material suspension from the width derivative of the attenuation curve near a frequency where the wavenumber is approximately equal to 1, or (3) determining a component ratio of the particles in the material suspension from a maximum value of the attenuation curve near a frequency where the wavenumber is approximately equal to 1.

The prior art of record also fails to teach and/or suggest an apparatus for determining a composition of a material comprising, in combination with the other recited elements, a means for measuring a wave attribute which comprises a first ultrasonic transducer transmitting an ultrasonic wave and a second ultrasonic transducer receiving the ultrasonic wave wherein the first ultrasonic transducer and the second ultrasonic transducer transmit and receive the ultrasonic wave at a select angle of offset relative to a line between the transducer centers.

The closest prior art is that of **Rose et al.** which teaches utilizing pattern recognition to determine the composition and/or classification of the material under test. There is no teaching of using slopes, widths, or other attributes of the attenuation curve to determine the composition of the material under test. There is also no teaching of offsetting the ultrasonic transducers from their centers as this appears to be counter productive in that less ultrasonic waves is transmitted directly from the transmitter to the receiver.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bertelson (US 3,802,271) discloses a method of acoustically analyzing particles in a fluid.

Iizuka (JP 05126805 A) discloses a method and apparatus for measuring a phase-speed curve.

Sinha (US 5,767,407) discloses a noninvasive identification of fluids by swept-frequency acoustic interferometry.

Reinhardt et al. (US 6,655,213 B1) discloses a method for examining a solidified and/or hardening material using ultrasound.

Liljenberg et al. (US 6,932,164 B2) discloses a refiner control utilizing acoustic signals.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M. Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RMM
30 September 2005

HEZRON WILLIAMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800